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4 December 1956

MEMORANDUM FOR: Chief, Psychological and Paramilitary Staff

SUBJECT: Terrain Warning Devices

REFERENCE: Memorandum to C/TSS from C/PPS dated 12 October 1956
Subj: Investigation of Terrain Warning Devices

1. As requested in the referenced memorandum members of this Staff have now completed a survey program covering the field of terrain warning devices. Attached hereto for your information is a descriptive list of equipment either currently available or under development which will at least partially meet specifications, along with recommendations for a projected course of action.

2. The attached [] proposal, covering a terrain warning system utilizing a three color radar scope presentation, is by far the most promising system proposed at this time. It is, therefore, our recommendation that this system be the one utilized in the [] aircraft.

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3. Should your Staff wish to proceed with the program, TSS will provide the necessary funds amounting to about \$650,000 for a 15-month program of research and development for the prototype equipment covered by the [] proposal. It is assumed Project [] funds will be used for the purchase of additional units which it is expected will cost approximately \$40,000 to \$50,000 each.

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4. The submission of this recommendation and report completely fulfills the request for an investigation into the field of terrain warning devices and to report the findings and recommendations.

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Attachments:

1. Descriptive List of Equipment
2. [] Proposal (withdrawn)

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Attachment 1 to Memo for C/PPS dated 4 December 1956

1. Passive Infrared Systems - By far the most advanced system of this type yet designed is the Perkin-Elmer AN/ASX-1 airborne infrared surveillance/mapping equipment. However, its limited resolution and more importantly its inability to produce target ranges make it unsuitable in the present application.

2. Radar Systems

a. Cornell Aeronautical Laboratory has developed hardware for a system known as "Pee-Vee", which is a mono-pulse, X-band radar plotting range vs. elevation or azimuth vs. elevation. It uses a 24" parabolic dish antenna (APG/46 type). The equipment weighs approximately 150 pounds. Due to a lack of funds, this project will be terminated upon conclusion of the present development phase. The "Pee-Vee" system does not appear suitable in this application due to the type of scope presentation utilized.

b. North American Aviation is pursuing a study of means for modifying the APS/23 X-band system. The modification has as its objective the alteration of the APS/23 for mono-pulse operation yielding a range vs. azimuth plot on the indicator scope. Since this program is at this time only a study phase, it is somewhat difficult to judge the potential application of such a system should it prove feasible in the first phase. This modification, however, again fails to provide sufficient information on the indicator scope.

c. A breadboard auxiliary indicator for the APS/23 system is being designed by General Mills. Its sole function will be to provide an indication to the operator of the equipment that a given target on the scope is either increasing or decreasing in range. The same lack is apparent in this General Mills system as described to systems a. and b. above.

d. The University of Illinois is working on a 2-color system which will provide in red target information on the scope face if it is above the flight path line. This will otherwise be a normal PFI presentation operating at X-band. This program is still in too early a stage to make any definite predictions. It is felt that at least one and probably two years more will be needed before some idea on the feasibility of this approach can be made available.

e. The terrain avoidance system as described in the attached proposal appears to be technically the most feasible, and, therefore, remains the choice of this Staff.

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